

## PATENT COOPERATION TREATY

## PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY  
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

REC'D 15 MAR 2006

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Applicant's or agent's file reference 1200309WO	FOR FURTHER ACTION		See Form PCT/IPEA/416
International application No. PCT/US04/24336	International filing date (day/month/year) 28 July 2004 (28.07.2004)	Priority date (day/month/year) 30 July 2003 (30.07.2003)	
International Patent Classification (IPC) or national classification and IPC IPC: Please See Continuation Sheet USPC: 524/70,127,327,387,424,442,445,447,451,481;525/191,232,238,240,241			
Applicant POLYONE CORPORATION			
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of <u>4</u> sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> (sent to the applicant and to the International Bureau) a total of <u>3</u> sheets, as follows:</p> <p><input type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>			
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the report</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p>			
Date of submission of the demand 23 February 2005 (23.02.2005)		Date of completion of this report 26 February 2006 (26.02.2006)	
Name and mailing address of the IPEA/ US Mail Stop PCT, Attn: IPEA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (571) 273-3201		Authorized officer Nathan M. Nutter Telephone No. 571-272-1700 Jean R. Nutter Paralegal	

Form PCT/IPEA/409 (cover sheet)(April 2005)

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# INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/US04/24336

## Box No. I Basis of the report

1. With regard to the language, this report is based on:

- ☒ the international application in the language in which it was filed.
- ☐ a translation of the international application into English, which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
- ☐ publication of the international application (under Rule 12.4(a))
- ☐ international preliminary examination (under Rules 55.2(a) and/or 55.3(a))

2. With regard to the elements of the international application, this report is based on (*replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report*):

- ☐ the international application as originally filed/furnished
- ☒ the description:  
 pages 1-23 as originally filed/furnished  
 pages\* NONE received by this Authority on \_\_\_\_\_  
 pages\* NONE received by this Authority on \_\_\_\_\_
- ☒ the claims:  
 pages NONE as originally filed/furnished  
 pages\* NONE as amended (together with any statement) under Article 19  
 pages\* 24-26E received by this Authority on 23 February 2005  
 pages\* NONE received by this Authority on \_\_\_\_\_
- ☐ the drawings:  
 pages NONE as originally filed/furnished  
 pages\* NONE received by this Authority on \_\_\_\_\_  
 pages\* NONE received by this Authority on \_\_\_\_\_
- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages \_\_\_\_\_
- ☐ the claims, Nos. \_\_\_\_\_
- ☐ the drawings, sheets/figs \_\_\_\_\_
- ☐ the sequence listing (*specify*): \_\_\_\_\_
- ☐ any table(s) related to the sequence listing (*specify*): \_\_\_\_\_

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages \_\_\_\_\_
- ☐ the claims, Nos. \_\_\_\_\_
- ☐ the drawings, sheets/figs \_\_\_\_\_
- ☐ the sequence listing (*specify*): \_\_\_\_\_
- ☐ any table(s) related to the sequence listing (*specify*): \_\_\_\_\_

\* If item 4 applies, some or all of those sheets may be marked "superseded."

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.  
PCT/US04/24336**Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement****1. Statement**

Novelty (N)	Claims <u>1-8</u>	YES
	Claims <u>NONE</u>	NO
Inventive Step (IS)	Claims <u>NONE</u>	YES
	Claims <u>1-8</u>	NO
Industrial Applicability (IA)	Claims <u>1-8</u>	YES
	Claims <u>NONE</u>	NO

**2. Citations and Explanations (Rule 70.7)**

Claims 1-8 lack an inventive step under PCT Article 33(3) as being obvious over SUMITOMO BAKELITE CO (EP-A-0 651 009) in view of KOPYTKO (US-A-5 717 020), IDEMITSU PETROCHEM CO LTD (JP 55 071736 A) and SUMITOMO BAKELITE CO LTD (JP 8 157659 A).

SUMITOMO BAKELITE CO (EP-A-0 651 009) discloses a thermoplastic elastomer composition comprising a thermoplastic phase and vulcanized rubber particles dispersed within the matrix. The reference employs ethylene-propylene-diene (EPDM) rubbers and styrene copolymer rubbers. Polypropylene (PP) may be employed as the matrix of the elastomer phase. The reference teaches the use of nucleation agents, including maleic anhydride-modified ethylene-propylene copolymers (MAH-EP) and fillers, including talc. Note page 3 (lines 43-50), page 6 (lines 27-53), page 7 (lines 35-45), page 10 (lines 6-9), page 12 (lines 20-23), page 13 (lines 43-45) and examples 1-5, 9, 10, 19, 20 and 23.

KOPYTKO (US-A-5 717 020) teaches compositions comprising EPDM elastomers, a thermoplastic polypropylene and a second polyolefin thermoplast. It is considered that the two thermoplastics phase-separate due to their different polarities. The compositions may contain fillers, including potassium aluminum silicates or talc. A styrene block copolymer may be present in the composition acting as a modifier. Other modifying agents include ethylene-acrylic acid copolymers. Note column 3 (lines 14-52) and Examples 1 and 2.

IDEMITSU PETROCHEM CO LTD (JP 55 071736 A) discloses moldable crystalline polypropylene compositions comprising polypropylene and an ethylene-propylene copolymer and/or EPDM terpolymers, among others. A second thermoplastic resin, ethylene-vinyl acetate copolymer, is also present. It is considered that the two thermoplastics phase-separate due to their different polarities. The cross-linkable diene component of the EPDM terpolymers is either ethylidene norbornene or dicyclopentadiene. Further, up to two parts by weight of a nucleating agent may be included in the compositions, imparting transparency. The reference teaches the use of carboxylic acids, dicarboxylic acids and their salts and talc. Note the Abstract.

SUMITOMO BAKELITE CO LTD (JP 8 157659 A) discloses polypropylene-based sheets comprising a polypropylene homopolymer, ethylene-propylene random copolymers and a hydrogenated styrene-butadiene elastomer or a hydrogenated styrene-isoprene elastomer. The polypropylene comprises 0.002- 0.3% by weight of a crystal-nucleating agent. The sheets exhibit excellent transparency. Note the Abstract.

The references, singly and together, teach the conventionality of using the constituents, as herein recited. A sheet is taught by SUMITOMO BAKELITE CO LTD (JP 8 157659 A). since films are produced by blow-molding techniques, a skilled artisan would know that the compositions taught by the references, singly or together, could be used to produce the films as recited herein.

NEW CITATIONS

**INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY**

International application No.  
PCT/US04/24336

**Supplemental Box**

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

Continuation of IPC:

C08L 23/00( 2006.01),23/04( 2006.01),25/04( 2006.01),9/00( 2006.01),33/20( 2006.01);C07F 9/09( 2006.01);C08K 5/521( 2006.01),5/138( 2006.01),5/05( 2006.01)  
C08K 3/04( 2006.01),3/26( 2006.01),3/34( 2006.01),5/01( 2006.01);C09C 1/42( 2006.01)

What is claimed is:

1. A molded article made from a composition comprising:  
at least one thermoplastic elastomer having at least one  
elastomeric phase and at least one thermoplastic phase, wherein the at least one  
5 thermoplastic phase consisting essentially of at least one propylene-based  
polymer and the at least one elastomer phase comprises a styrenic copolymer  
rubber phase or an at least partially crosslinked ethylene-propylene-diene rubber  
phase; and  
at least one nucleating agent for formation of nucleation sites for  
10 crystal growth within the thermoplastic phase of the thermoplastic elastomer,  
wherein the nucleating agent comprises sodium benzoate, a sorbitol derivative,  
an organic phosphate ester salt, an acrylic acid-grafted polypropylene, a  
nucleating talc, or combinations thereof, and  
wherein the molded article has been molded from the  
15 thermoplastic elastomer and the nucleating agent has enhanced the rate of  
crystal formation in the thermoplastic phase of the thermoplastic elastomer  
during cooling of the thermoplastic elastomer to achieve a solid crystal structure  
for the molded article in a shorter time as compared to melt-processing of the  
thermoplastic elastomer into the molded article without the nucleating agent.  
20
2. The molded article of claim 1, wherein the at least one nucleation  
agent is dispersed within the at least one thermoplastic phase.
- 25 3. The molded article of claim 1, wherein the thermoplastic  
elastomer comprises at least two chemically distinct thermoplastic phases.
4. The molded article of claim 3,

wherein the thermoplastic phase comprises a continuous phase and the elastomer phase comprises a discontinuous phase dispersed in the continuous thermoplastic elastomer phase.

5           5.       The molded article of claim 4, wherein the composition comprises about 0.005% to about 5% by weight nucleating agent based on total weight of the thermoplastic phase in the thermoplastic elastomer.

10           6.       The molded article of claim 5, wherein the thermoplastic elastomer comprises at least one thermoplastic phase of polypropylene; and wherein the thermoplastic elastomer comprises styrene-butadiene (SB) rubber, styrene-ethylene-butadiene-styrene (SEBS) rubber, styrene-ethylene-propylene-styrene (SEPS) rubber, styrene-isoprene-styrene (SIS) rubber, styrene-ethylene-ethylene-propylene-styrene (SEEPS) rubber, styrene propylene-styrene (SPS) rubber, hydrogenated versions of the foregoing, or combinations thereof.

20           7.       The molded article of claim 6, wherein the article has enhanced transparency as compared to an article formed from a composition without the nucleating agent.

25           8.       A method of using a nucleating agent to enhance rate of formation of a solid crystal structure in a thermoplastic elastomer being molded into an article, comprising the steps of:

            adding a nucleating agent to a thermoplastic phase of a thermoplastic elastomer to form the thermoplastic elastomer composition referred to in any of claims 1-7;

            molding the thermoplastic elastomer composition into the article;  
            permitting the thermoplastic elastomer composition in the article to cool, wherein the nucleating agent stimulates formation of a solid crystal structure

within the thermoplastic phase of the thermoplastic elastomer composition more rapidly than if the nucleating agent were not present.

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